REMARKS

The Examiner's rejection of claims 1, 3, 7-12, 16-21, 25 and 28 under 35 U.S.C. § 103(a) for being unpatentable over the Ando et al. U.S. Patent No. 5,012,105 in view of the Le Poole U.S. Patent No. 4,524,278, as this rejection may be attempted to be applied to the amended claims, is respectfully traversed.

In support of this traverse, it is noted that the Examiner alleges that claim 1 is made obvious by Ando *et al.* US Patent No. 4,851,097 in view of Le Poole US Patent No. 4,524,278. However, the Examiner in his rejection fails to (explicitly or implicitly) refer to the feature of claim 1 that:

> "for each sub-beam, the respective aperture of the first of the at least one aperture plate defines the size and shape of the sub-beam cross-section and the multibeam optical system produces an image of said aperture on the substrate surface"

and does not cite any passage of Ando et al. or Le Poole as anticipating this feature.

Therefore, applicants respectfully request reconsideration of the rejection of claim 1. Applicants further point out that neither of those references, taken individually or in combination, discloses or suggests all of the subject matter recited in claim 1.

Ando discloses a multiple-imaging charged particle beam exposure system, wherein the beam travels through an object aperture 3a and a beam limiting aperture plate 31 (Fig. 7). The beam limiting aperture plate 31 defines a plurality of ion beams (col. 7 lines 41–45). The object aperture 3a shapes the cross-section of the Ion-beam 201 so that images having the shape of the cross-section are

formed on the workpiece 8 (col. 5 lines 41–44). In other words, one aperture 3a which is common for all of the ion-beams is imaged multiplied onto the target 8. This concept ensures that identical images are produced on the individual areas that the ion-beams are writing.

In applicants' apparatus, as set forth in claim 1, it is the aperture in the first aperture plate (which corresponds to the beam-limiting aperture plate 31 rather than the object aperture 3a of Ando et al.) which is imaged onto the substrate by means of the respective ion-beam. In other words, a plurality of apertures is imaged individually onto the target.

Thus, Ando et al. teaches a different imaging concept. Moreover, Ando et al. provides an alternative imaging layout for a person skilled in the art and, therefore, teaches away from the invention.

While Le Poole calls for:

"an electrode system with a matrix of beam deflectors in which each of the elementary beams can be Independently manipulated"

Le Poole is silent about which shape is imaged onto the target. (For instance, Le Poole, col. 4, lines 50–53 mentions that the spot defined by an elementary beam may be of size $1 \times 1\ \mu m^2$, but not to which aperture, if any, this corresponds.)

Also note that Le Poole EP 0 087 196 and U.S. Patent 4,524,278, except for the respective claims of these patents, are substantially identical and both claim priority from NL patent application no. 8200559, filed Feb. 15, 1982.

It is important to note that applicant's imaging concept is of particular importance in order to achieve stable and reproducible image positions of the multi-beam images on a substrate.

In applicant's concept a small lateral drift of the source (or angular disturbance due to environmental interference) does not, in the first order, cause

an image placement error of the multi-beam images on the substrate, whereas in the concept of Ando et al. the same would lead unavoidably to a global drift of all images. Therefore, to allow a resolution typically far below 100 nm, Ando et al.'s concept requires an extremely accurate alignment and angular stability of the illumination system or other means to control the placement, whereas, in applicants' apparatus, such requirements can be avoided.

Thus, Ando et al. teaches a different imaging concept, which does not offer the advantages as offered by the applicants' apparatus. Moreover, Ando by teaching a different imaging layout to a person skilled in the art, teaches away from the claimed apparatus and method.

Therefore, Applicants hold the opinion that the apparatus claimed in claim 1 and the method claimed in claim 19 are novel and un-obvious.

The Examiner's rejection of claims 2, 13, 14, 22 and 23 under 35 U.S.C. § 103(a) for being unpatentable over the Ando et al. U.S. Patent No. 5,012,105 in view of the Le Poole U.S. Patent No. 4,524,278, and further in view of the Nakasugi et al. U.S. Patent No. 5,933,211, as this rejection may be attempted to be applied to the amended claims, is respectfully traversed.

In support of this traverse, while Nakasugi et al. teaches the use of a collimator in a BEAM LITHOGRAPH APPARATUS AND METHOD, Nakasugi et al. does not teach applicant's use of a collimator. Further, Ando et al, Le Poole and Nakasugi et al. do not teach the provision of a:

> "deflection unit positioned after the multibeam optical system and adapted to correct individual imaging aberrations of the respective sub-beam with respect to the desired target position and/or position the sub-beam during a writing process an the substrate surface".

Further, applicant objects to and rejects the Examiner's attempt to take "Official Notice" of the alleged equivalency of the reference marks and the reference plate for their use in the lithography art and requests "solid evidence" of

this alleged equivalency. See Ex parte Leavell, 212 USPQ 763 where Mr. Willamosky, speaking for the Board of Appeals stated:

The legal conclusion of obviousness must be bottomed on a solid evidentiary base."

The Examiner's rejection of claims 5, 6, 26 and 27 under 35 U.S.C. § 103(a) for being unpatentable over the Ando et al. U.S. Patent No. 5,012,105 in view of the Le Poole U.S. Patent No. 4,524,278 and further in view of the Mankos U.S. Patent No. 6,157,039, as this rejection may be attempted to be applied to the amended claims, is respectfully traversed.

In support of this traverse, while Mankos teaches a magnification factor of 20:1, the combination of Ando et al., Le Poole and Mankos, do not teach the combination set forth in claims 1 and 19 and the narrower combinations in claims 5, 6, 26, and 27. Thus these claims are considered patentable for the same reasons claims 1 and 19 are considered patentable over Ando et al. and Le Poole as explained above.

Further, Mankos does not teach or suggest a magnification factor of 400:1.

The Examiner's rejection of claims 15 and 24 under 35 U.S.C. § 103(a) for being unpatentable over the Ando et al. U.S. Patent No. 5,012,105 in view of the Le Poole U.S. Patent No. 4,524,278 and further in view of Le Poole EP 0 087 196, as this rejection may be attempted to be applied to the amended claims, is respectfully traversed.

In support of this traverse, it is first of all noted that Le Poole '278 and '196 are substantially identical.

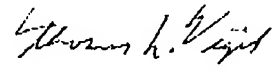
Further, Le Poole teaches an aperture plate 32 between a first beam splitting device 6 and a beam deflection system 8 and a second aperture plate 34 between the beam deflection device 8 and a second beam splitting device 10. Le

Poole clearly does not teach several sequential aperture plates as now defined more clearly in the amended claims.

In summary, applicants submit that the amended application re clear of the references cited for the reasons set forth above and that the application is now in condition for allowance. An early and favorable action to that end is requested.

Respectfully submitted,

WELSH & KATZ, LTD.

By 

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